

National Educational Framework for Anesthesia Assistants

Ensuring the provision of safe and competent patient care.



INTRODUCTION

In 2008 the **CAS Task Force on Anesthesia Assistants** was formed with a representative from the Canadian Anesthesiologists' Society (**CAS**), the Association of Canadian University Departments of Anesthesia (**ACUDA**), the National Alliance of Respiratory Therapy Regulatory Bodies (**NARTRB**), National Association of PeriAnesthesia Nurses of Canada (**NAPANc**), Canadian Nurses Association (**CNA**), and the Canadian Society of Respiratory Therapists (**CSRT**). Mr Jeff Kobe was invited to join the Task Force because of his previous involvement with the creation of the base document for the CSRT. The goal of the task force was to establish the basic knowledge requirements to be used by all programs across Canada. The *Foundation Knowledge for Anesthesia Assistants* document produced by the CSRT in 2002 was used as the framework. What you now have here is the final document endorsed by each of these organizations represented by their logo on the front cover. This document is to be periodically revised for approval by all the Associations and Societies listed above.

The history of the initial document is: In 2002, The Canadian Society of Respiratory Therapists (CSRT) initiated a project to define the scope of activities and duties of an anesthesia assistant. The project involved analyzing the occupation in order to identify the skills and knowledge necessary for safe and competent practice.

An initial compilation of the Anesthesia Assistant Specialist Occupational Profile was created from the course outlines from Thompson Rivers University, The Michener Institute for Applied Health Sciences and Vanier College as well as the approved skills profile from the Province of Quebec. This initial draft was reviewed by a group of anesthesia assistant specialist workers who were currently working in the occupation or in closely related job roles, along with a coordinator who assisted them in critiquing the skills, knowledge and attitudes in terms of currency, completeness, degree of detail and relevance.

Due to the rapid evolution of the anesthesia assistant role across Canada, from 2005 to 2008 the CSRT distributed the document to stakeholders throughout the country and facilitated workshops that included educators & clinical practice representatives. The intention was to update this document to more accurately define the educational requirements necessary for safe and competent practice by anesthesia assistants. By involving invested stakeholders, this process ensures that education and subsequent examination meet the most current professional requirements.

In November 2008 stakeholders including schools teaching anesthesia assistant programs, the CSRT, the Canadian Anesthesiologists' Society (CAS), the Association of Canadian University Departments of Anesthesia (ACUDA) and representation from the National Alliance of Respiratory Therapy Regulatory Bodies (NARTRB) met. At this meeting the importance of multidisciplinary collaboration was underscored. The committee recognized and endorsed the concept that respiratory therapists, nurses and other appropriately qualified health care professionals may enter the profession of Anesthesia Assistant after completing a recognized program.

This document is not designed as a competency profile for anesthesia assistants; rather it serves to provide a foundation for curriculum development as well as a resource to further develop this growing profession.

The intention of this document is to provide the foundation and basic information for:

- educational institutions in the development of their curricula;
- career path development;
- appropriately emphasizing the depth and scope of the training required to enter the role of anesthesia assistant;
- development of performance standards and/or performance appraisal tools;
- retraining needs for individuals to allow job mobility within the field;
- evaluating out of province credentials for anesthesia assistants;
- evaluating prior learning experiences for anesthesia assistants.

This document may provide a useful basis in the future for the development of a competency profile for anesthesia assistants; the development of written and practical examinations; and the development of a national accreditation process.

TABLE OF CONTENTS

A. Introduction to Anesthesia	5
1. Discuss the principles of anesthesia.....	5
2. Describe induction of anesthesia.....	5
B. Anesthesia Pharmacology	6
1. Explain the basic pharmacology principles of anesthesia.....	6
2. Discuss the pharmacology of inhalational anesthetics.....	6
3. Compare skeletal muscle relaxants.....	7
4. Compare intravenous agents.....	7
5. Compare local anesthetics.....	8
6. Discuss Emergency Drugs.....	8
C. Anesthesia Equipment	9
1. Explain the anesthesia workstation.....	9
2. Discuss vaporizers.....	9
3. Explain anesthesia breathing systems.....	10
4. Explain anesthesia ventilators.....	10
5. Explain scavenge systems.....	11
6. Describe potential hazards of anesthesia gas delivery.....	11
7. Describe gas monitoring during anesthesia.....	11
8. Describe equipment checkout.....	12
D. Airway Management	13
1. Describe airway management.....	13
E. Physiological Monitoring (Invasive)	14
1. Describe the physics and technical details of hemodynamic monitoring.....	14
2. Describe arterial pressure monitoring.....	14
3. Describe central venous pressure monitoring.....	14
4. Describe pulmonary artery pressure monitoring.....	14
5. Describe cardiac output measurement techniques.....	15
6. Describe clinical application of mixed venous oxygen saturation measurement.....	15
7. Describe the clinical application of hematological laboratory data.....	15
F. Physiological Monitoring (Non-invasive)	16
1. Describe non-invasive monitors.....	16
2. Describe Temperature Monitoring.....	16
G. Principles of Asepsis and Sterile Technique	17
1. Describe aseptic technique.....	17
2. Describe sterile technique.....	17
3. Describe the transmission of microorganisms.....	17
4. Describe/Discuss aseptic technique and Environmental Controls.....	17
5. Describe routine and Enhanced Precautions.....	17
6. Discuss the principles and application of sterile technique.....	17
H. General Anesthesia	18
1. Describe anesthesia workstation preparation.....	18
2. Describe peripheral intravenous access insertion techniques.....	18
3. Specify physiological monitoring requirements.....	18
4. Describe induction of anesthesia.....	18
5. Describe positioning techniques.....	18
6. Explain fluid therapy.....	19
7. Explain blood therapy.....	19

8. Explain maintenance of anesthesia.....	19
9. Explain emergence from anesthesia.....	20
I. Regional Anesthesia	21
1. Describe a spinal anesthetic.....	21
2. Describe an epidural anesthetic.	21
3. Describe peripheral nerve blocks (PNB).....	22
J. Post Anesthesia Care	23
1. Understand the nature of peri-anesthetic care.....	23
K. Pain Management	24
1. Discuss management of acute postoperative pain.....	24
2. Discuss management of chronic pain.....	24
L. Special Considerations in Anesthesia	25
1. Crisis management.....	25
2. Describe patients with cardiac disease.	25
3. Discuss management of chronic pain.....	25
4. Discuss anesthetic considerations in special circumstances.....	25
M. Day of Surgery Assessment	27
1. Describe preanesthesia assessment.	27

A. Introduction to Anesthesia

1. Discuss the principles of anesthesia.

- a. Describe the basic components of general anesthesia.
- b. Discuss the goals of anesthesia maintenance.
- c. Describe the four phases of general anesthesia.
- d. Describe the categories of agents used to provide general anesthesia.
- e. Describe indications for regional vs. general anesthesia.
- f. Discuss the goals of emergence from anesthesia.
- g. Discuss/describe conscious sedation and monitoring.

2. Describe induction of anesthesia.

- a. Describe rapid sequence induction in terms of:
 - indications
 - contraindications
 - precautions
- b. Describe inhalational induction in terms of:
 - indications
 - contraindications
 - precautions
- c. Describe IV induction in terms of:
 - indications
 - contraindications
 - precautions

B. Anesthesia Pharmacology

1. Explain the basic pharmacology principles of anesthesia.

- a. Discuss basic terms such as:
 - agonist
 - antagonist
 - receptor
 - additive effect
 - synergistic effect
 - tolerance
 - tachyphylaxis
 - idiosyncrasy
- b. Describe dose-response curves in terms of:
 - effect
 - potency
 - efficacy
- c. Describe the anatomy and physiology of the autonomic nervous system.
- d. Describe the sympathetic nervous system.
- e. Describe the parasympathetic nervous system.
- f. Discuss the principles of pharmacokinetics in terms of:
 - absorption
 - distribution
 - metabolism
 - excretion
- g. Discuss the principles of pharmacodynamics in terms of:
 - effects on receptors
 - mechanisms of action
- h. Review the effects in terms of anesthetic interactions of drugs such as:
 - catecholamines
 - sympathomimetics
 - antihypertensives
 - beta-adrenergic agonists
 - beta-adrenergic antagonists
 - anticholinergics
 - anticholinesterases
 - antihistamines

in terms of:

 - mechanisms of action
 - pharmacological effects
 - indications/contraindications
 - side effects
 - dosage

2. Discuss the pharmacology of inhalational anesthetics.

- a. Explain inhalational anesthetics in terms of:
 - diffusion hypoxia
 - agent solubility
 - compartments of anesthesia
 - second gas effect
 - balanced anesthesia
 - interaction with CO₂ absorbents
- b. Describe the characteristics of inhalational anesthetic agents such as:
 - isoflurane
 - halothane
 - nitrous oxide
 - desflurane
 - sevoflurane
 - xenon

in terms of:

 - mechanisms of action
 - pharmacological effects
 - indications/contraindications
 - side effects
 - dosage
 - MAC

- MH trigger

c. Discuss the factors which alter inhaled anesthetic agents such as:

- age, gender
- duration of surgery
- pharmacologic interaction
- type of surgery
- co-morbidity

d. Explain the effects of inhalational agents on ventilation:

- pattern of breathing
- respiratory muscle function
- airway irritability
- bronchodilation
- PaCO₂
- ventilatory response to CO₂
- ventilatory response to hypoxemia
- hypoxic pulmonary vasoconstriction

e. Explain the effects of inhalational agents on circulation:

- arterial blood pressure
- heart rate
- stroke volume
- cardiac output
- myocardial contractility
- systemic vascular resistance
- coronary vascular resistance
- right atrial pressure

3. Compare skeletal muscle relaxants.

a. Compare depolarizing with non-depolarizing muscle relaxants in terms of:

- action on the neuromuscular junction
- MH trigger
- airway management

b. Explain the characteristics of muscle relaxants such as:

- succinylcholine
- mivacurium
- atracurium
- cis-atracurium
- rocuronium
- pancuronium
- tubocurarine
- norcuron

in terms of:

- mechanism of action
- pharmacological effects
- indications/contraindications
- timing of administration
- pseudocholinesterase deficiency
- side effects
- dosage
- reversal
- onset of action

c. Explain the characteristics of reversal agents such as:

- muscarinic
- nicotinic
- cholinesterase inhibitors

4. Compare intravenous agents.

a. Explain the pharmacology of barbiturates such as:

- thiopental
- methohexital

in terms of:

- mechanism of action
- pharmacological effects
- indications/contraindications
- side effects
- dosage
- reversal

b. Explain the pharmacology of benzodiazepines such as:

- midazolam
- diazepam

in terms of:

- mechanism of action
- pharmacological effects
- indications/contraindications
- side effects
- dosage
- reversal

c. Explain the pharmacology of opiates such as:

- fentanyl
- remifentanyl
- hydromorphone
- sufentanil
- morphine

in terms of:

- mechanism of action
- pharmacological effects
- indications/contraindications
- side effects
- dosage
- reversal

d. Explain the pharmacology of non barbiturate intravenous anesthetics such as:

- ketamine
- propofol
- etomidate

in terms of:

- mechanism of action
- pharmacological effects
- indications/contraindications
- side effects
- dosage

e. Explain the pharmacology of:

- benzodiazepine antagonists
- opioid antagonists

in terms of:

- mechanism of action
- pharmacological effects
- indications/contraindications
- side effects
- dosage

5. Compare local anesthetics.

a. Explain the pharmacology of local anesthetics such as:

- lidocaine
- bupivacaine
- EMLA
- marcaine
- AMTOP

in terms of:

- mechanism of action
- pharmacological effects
- indications/contraindications
- side effects
- dosage

b. Discuss the clinical indications for the various agents.

c. Explain the use of a vasoconstrictor as an additive with local anesthetic.

d. Explain the clinical indications for routes of administration such as:

- IV
- topical
- subcutaneous

e. Discuss lipid rescue.

6. Discuss Emergency Drugs.

C. Anesthesia Equipment

1. Explain the anesthesia workstation.

- a. Discuss all relevant standards including CSA and Workplace Safety Standards.
- b. Describe all anesthesia machine components including:
 - cylinder
 - flow control valve
 - pipeline inlet connections
 - pipeline pressure gauges
 - machine piping
 - gas power outlet for ventilator
 - master switch
 - common gas outlet
 - regulator
 - rotometers
 - oxygen pressure failure devices
 - oxygen flush valve
 - gas selector switch
 - second stage regulator
 - auxiliary flow meter
- c. Discuss safety devices:
 - minimum oxygen flow
 - minimum oxygen ratio
 - pressure relief valves
 - minimum oxygen ratio device
 - alarms
- d. Evaluate problems, explain troubleshooting techniques and implement corrective actions in terms.

2. Discuss vaporizers.

- a. Discuss all relevant standards including CSA and Workplace Safety Standards.
- b. Describe vaporizers in terms of:
 - vapour pressure
 - partial pressure
 - thermal conductivity
 - specific heat
 - boiling point
 - volume percent
 - thermal stabilization
- c. Classify vaporizers according characteristics such as:
 - concentrated-calibrated
 - measured flow
 - flowpower
 - bubble through
 - injection
- d. Discuss temperature compensation in terms of supplied heat and thermal compensation.
- e. Discuss the effects of high/low atmospheric pressure on vaporizers:
 - concentrated-calibrated vaporizers
 - measured flow vaporizers
- f. Describe the pumping effect & pressurizing effect of intermittent back pressure on vaporizers in terms of:
 - factors
 - mechanisms
 - minimizing the pumping effect
- g. Assess the vaporizer for:
 - physical damage
 - obstruction of fresh gas flow
 - incorrect calibration
 - servicing requirements

- h. Discuss the arrangement of vaporizers on the anesthesia machine.
- i. Describe in-system vaporizers.
- j. Discuss mounting systems for vaporizers.
- k. Describe potential hazards of vaporizers including:
 - using incorrect agent
 - leaks
 - interlock selection
 - tipping
 - overfilling
 - dial position

3. Explain anesthesia breathing systems.

- a. Discuss all relevant standards including CSA and Workplace Safety Standards.
- b. Discuss physics as it relates to anesthesia breathing systems.
- c. Discuss factors influencing rebreathing such as:
 - fresh gas flow
 - mechanical deadspace
- d. Discuss the effects of breathing including:
 - retention of water
 - carbon dioxide
 - oxygen
 - anesthetic agents
 - alteration of inspired gas tensions
- e. Discuss the discrepancy between inspired and delivered volumes
- f. Discuss the discrepancy between dialed in and delivered concentrations including:
 - rebreathing
 - leaks
 - dilution
 - release of anesthetic agent from the system
 - uptake of anesthetic agents by breathing systems
- g. Explain the function of components such as:
 - one way valves
 - PEEP valves
 - reservoir bag
 - breathing tubes
 - adjustable pressure limiting (APL) valve
- h. Describe breathing systems such as:
 - Mapleson
 - Coaxial circle
 - Circle
 - Bain
- i. Discuss breathing system adjuncts such as:
 - HME and heated humidifier
 - filters
- j. Discuss CO₂ elimination.
- k. Evaluate problems, explain troubleshooting techniques and implement corrective actions for breathing systems such as:
 - excessive airway pressure
 - anesthetic agent overdose
 - inhalation of a foreign body
 - inadvertent exposure to volatile agents

4. Explain anesthesia ventilators.

- a. Discuss all relevant standards including CSA and Workplace Safety Standards.

- b. Describe the function of components of the ventilator such as:
 - drive mechanism
 - pneumatic control
 - pneumatic control
 - spill valve
 - exhaust valve
 - safety relief valve
 - electronic control
- c. Evaluate and adjust ventilation modes & parameters.
- d. Describe fresh gas flow compensation.
- e. Describe circuit compliance compensation.

5. Explain scavenge systems.

- a. Discuss all relevant standards including CSA and Workplace Safety Standards.
- b. Describe the general effects and hazards of exposure to trace levels of anesthetic gases and vapours.
- c. Describe how to control trace anesthetic gases.
- d. Discuss the components of the scavenging system.
- e. Discuss potential hazards associated with scavenging equipment.
- f. Describe techniques and procedures for monitoring trace gases.

6. Describe potential hazards of anesthesia gas delivery.

- a. Discuss all relevant standards including CSA and Workplace Safety Standards.
- b. Describe causes of unsafe gas delivery such as:
 - incorrect gas supply
 - leaks
 - hypoxic gas mixture
 - air entrainment
- c. Discuss the causes of hypoventilation & hyperventilation.
- d. Discuss the effects of hypoventilation & hyperventilation.

7. Describe gas monitoring during anesthesia.

- a. Discuss all relevant standards including CSA and Workplace Safety Standards.
- b. Describe gas monitoring systems.
- c. Describe techniques for measuring gases such as:
 - oxygen
 - anesthetic agents
 - nitrogen
 - carbon dioxide
 - nitrous oxide
 - nitric oxide
- d. Discuss methods and implications of returning scavenged gas to the breathing circuit.

8. Describe equipment checkout.

- a. Describe standards of anesthesia machine checkout as per CAS practice guidelines.
- b. Describe anesthetic equipment operational checks as per manufacturer's specifications and relevant standards.
- c. Describe all ancillary equipment checks.
- d. Describe a Quality Assurance program for anesthesia equipment.

D. Airway Management

1. Describe airway management.

- a. Describe the components of an airway assessment, such as:
 - anesthetic history
 - physical assessment of the airway
 - other anatomical characteristics affecting the airway
 - Mallampati classification
- b. Describe the techniques used to maintain or secure a patent airway:
 - chin lift/jaw thrust
 - bag/mask ventilation
 - supraglottic airway device insertion
 - endotracheal intubation
- c. Describe & compare devices used for airway management.
- d. Describe adjunct intubation devices.
- e. Describe management of the difficult airway based on the ASA difficult airway algorithm.
- f. Describe techniques to ensure proper placement of airway devices.
- g. Discuss airway care & maintenance during the intraoperative period.
- h. Discuss techniques used for the safe removal of airway devices and discontinuance of airway maintenance.
- i. Discuss & describe the surgical airway:
 - landmarking
 - insertion techniques
- j. Identify risks & complications of airway management. Discuss associated troubleshooting & corrective actions.

E. Physiological Monitoring (Invasive)

1. Describe the physics and technical details of hemodynamic monitoring.

- a. Explain the components of fluid-filled monitoring systems including:
 - types
 - catheter and tubing
 - pressure bags
 - electronic components
 - flush system
 - solution selection
- b. Describe the physical principles involved in pressure monitoring.
- c. Describe monitoring system assembly.
- d. Describe referencing, dynamic response testing, leveling and calibration of system.
- e. Describe the effects on hemodynamics of support mechanisms such as:
 - ECLS
 - Aortic balloon pump
 - IVOX
 - Ventricular Assist Device

2. Describe arterial pressure monitoring.

- a. Explain arterial pressure in terms of:
 - normal values
 - waveform morphology
 - measurement sites
- b. Compare direct and indirect blood pressure measurement techniques.
- c. Describe the clinical applications of arterial blood pressure monitoring in terms of:
 - indications/contraindications
 - insertion techniques
 - complications

3. Describe central venous pressure monitoring.

- a. Explain central venous pressure in terms of:
 - normal values
 - waveform morphology
 - measurement sites
- b. Describe the clinical applications of central venous pressure monitoring in terms of:
 - indications/contraindications
 - insertion techniques
 - complications

4. Describe pulmonary artery pressure monitoring.

- a. Explain pulmonary artery pressure in terms of:
 - normal values
 - waveform morphology
 - measurement sites
- b. Describe the clinical applications of pulmonary artery pressure monitoring in terms of:
 - indications/contraindications
 - insertion techniques
 - complications

5. Describe cardiac output measurement techniques.

- a. Describe the physiological factors affecting cardiac output as related to anesthesia.
- b. Describe the invasive and non-invasive methods of calculating cardiac output in terms of:
 - indications/contraindications
 - measurement techniques
 - complications
- c. Explain the clinical significance of derived values including:
 - CVS
 - SVRI
 - SV
 - PVR
 - SVR
 - PVRI
 - LVSW

6. Describe clinical application of mixed venous oxygen saturation measurement.

- a. Describe the physiological factors affecting mixed venous oxygen saturation as related to anesthesia.
- b. Describe the techniques of continuous monitoring of mixed venous oxygen saturation in terms of:
 - indications/contraindications
 - measurement techniques
 - complications

7. Describe the clinical application of hematological laboratory data.

- a. For hematological lab parameters such as:
 - ABG
 - electrolytes
 - INR
 - hemoglobin's
 - CBC
- explain each parameter in terms of:
- normal values
 - measurements sites
 - clinical significance

F. Physiological Monitoring (Non-invasive)

1. Describe non-invasive monitors.

For non-invasive monitors such as:

- | | |
|----------------------|--------------------|
| - ECG | - BP |
| - SpO ₂ | - capnometry |
| - temperature | - processed EEG |
| - transcutaneous gas | - respiratory rate |
| - nerve stimulators | |

- a. Explain each monitor in terms of:
 - normal values
 - monitoring sites
- b. Describe the clinical application of each monitor in terms of:
 - indications/contraindications
 - complications/hazards
 - monitoring technique

2. Describe Temperature Monitoring.

- a. Describe normal thermoregulation
 - afferent input
 - central control
 - efferent responses
 -
- b. Describe thermoregulation during general anesthesia
- c. Discuss the development of hypothermia during general anesthesia
- d. Discuss perioperative thermal manipulations
- e. Describe hyperthermia, and Malignant Hyperthermia, and fever
- f. Describe temperature monitoring

G. Principles of Asepsis and Sterile Technique

- 1. Describe aseptic technique.**
- 2. Describe sterile technique.**
- 3. Describe the transmission of microorganisms.**
- 4. Describe/Discuss aseptic technique and Environmental Controls.**
- 5. Describe routine and Enhanced Precautions.**
- 6. Discuss the principles and application of sterile technique.**

H. General Anesthesia

1. Describe anesthesia workstation preparation.

- a. Discuss anesthesia care plan with respect to:
 - i. preparation of equipment specific to patient condition
 - ii. premedication drugs specific to:
 - patient condition
 - length of procedure
 - type of surgery
 - dosage
 - iii. preparation of emergency drugs
 - iv. pre-patient anesthetic machine and ancillary equipment check
 - v. pre-patient airway equipment check

2. Describe peripheral intravenous access insertion techniques.

- a. Describe IV access in terms of
 - advantages and disadvantages
 - catheters
 - complications of IV insertion
 - insertion procedures
 - access in relation to pathophysiology and surgical procedure
- b. Describe fluid administration sets such as:
 - primary
 - secondary
 - warmed
 - filtered
 - blood

3. Specify physiological monitoring requirements.

- a. Describe Canadian Anesthesiologists Society monitoring guidelines.
- b. Describe patient's monitoring needs.

4. Describe induction of anesthesia.

- a. Describe rapid sequence induction in terms of:
 - indications
 - contraindications
 - precautions
 - modified
- b. Describe inhalational induction in terms of:
 - indications
 - contraindications
 - precautions
- c. Describe IV induction in terms of:
 - indications
 - contraindications
 - precautions

5. Describe positioning techniques.

- a. Describe the importance of positioning, such as:
 - surgical requirements
 - patient limitations

- b. Describe protective measures to minimize complications associated with patient positioning such as:
 - prone
 - Trendelenburg
 - lateral decubitus
 - lithotomy
 - supine
 - sitting
 - Semi-fowler's
- c. Describe complications with positioning such as
 - skin injury
 - appendage injury
 - injury to nerves such as ulnar, radial, brachial plexus, sciatic, common peroneal, anterior tibial, femoral, obturator and saphenous
 - eye injury
 - hemodynamic compromise

6. Explain fluid therapy.

- a. Determine body fluids in terms such as:
 - compartments
 - gender
 - age
 - body habitus
- b. Determine fluid requirements in terms of:
 - maintenance fluids
 - third space loss
 - blood loss
 - fluid deficit
 - insensible loss
- c. Describe fluid therapy with and without blood loss.

7. Explain blood therapy.

- a. Discuss indications and complications of blood therapy in terms of:
 - platelets
 - cryoprecipitate
 - cell-saver blood
 - autologous blood
 - human prothrombin complex concentrate
 - FFP
 - clotting factors
 - allogenic
 - whole blood
- b. Understand normal and abnormal lab testing and point of care testing such as:
 - ACT
 - INR
 - TEG
- c. Describe administration techniques for blood products in terms of:
 - site of administration
 - administration sets
 - Canadian Blood Services Standards
 - filters
 - fluid warming (equipment, techniques, indication)
- d. Explain factors relating to blood administration such as:
 - risks of blood supply
 - religious considerations
 - consent
 - blood sparing techniques (eg. EPO, pre-op autologous)

8. Explain maintenance of anesthesia.

- a. Explain the use of monitoring techniques that require no instrumentation to maintain/evaluate depth of anesthesia such as:
 - inspection
 - auscultation
 - palpation

- b. Interpret monitoring of physiological parameters with respect to anesthesia such as:
 - ECG
 - BP
 - SpO₂
 - inspired/expired agents & gases
 - temperature
 - renal function
 - transcutaneous gases
 - respiratory function
 - ventilation pressures
 - tidal volume
- c. Describe the use of invasive monitoring with respect to anesthesia such as:
 - arterial blood pressure
 - pulmonary artery catheter pressures
 - central venous pressure
 - echocardiography
- d. Describe the use of nervous system monitors with respect to anesthesia such as:
 - EEG
 - evoked potentials
 - bispectral analysis
 - peripheral nerve stimulators
- e. Describe adjustment of medications to maintain anesthesia.
- f. Interpretation of ECG monitoring.
 - ST deviations
 - arrhythmias

9. Explain emergence from anesthesia.

- a. Explain discontinuance of anesthetic agents:
 - timing
 - correlation of PNS results
 - reversal agents
 - evaluation of ventilatory drive
 - hemodynamics
- b. Describe extubation of patient including complications such as:
 - diffusion hypoxia
 - incomplete reversal
 - pseudocholinesterase deficiency
 - laryngospasm
- c. Describe transfer of patient to postoperative area in terms of :
 - Hands-off communication
 - positioning
 - monitoring
 - oxygenation
 - ventilation
- d. Explain post-operative patient care planning.
 - Knowledge of discharge criteria

I. Regional Anesthesia

1. Describe a spinal anesthetic.

- a. Review the anatomy of the spinal column.
- b. Describe the indications and contraindications for a spinal anesthetic.
- c. Describe the physiological effects of spinal anesthesia.
- d. Discuss how the distribution of local anesthetic in CSF is influenced by:
 - baricity of the solution
 - contour of the spinal canal
 - position of the patient during and in the first few minutes after placement of the drug
- e. Discuss how type of drugs and vasoconstrictor affect the duration of anesthetic.
- f. Describe how to evaluate spinal anesthetic for effectiveness.
- g. Discuss complications of a spinal anesthetic such as:
 - nausea
 - urinary retention
 - hypotension
 - backache
 - post spinal headache
 - neurological sequelae
 - high spinal
 - hypoventilation
- h. Discuss the equipment required for a spinal anesthesia.
- i. Describe the technique for a spinal anesthetic.
- j. Describe use of a nerve stimulator for establishment and monitoring of a spinal anesthetic.

2. Describe an epidural anesthetic.

- a. Review the anatomy of the spinal column.
- b. Describe the indications and contraindications for an epidural anesthetic.
- c. Describe the physiological effects of epidural anesthesia.
- d. Describe how to evaluate epidural anesthetic for effectiveness.
- e. Describe the medications used for epidural anesthesia in terms of:
 - mechanism of action
 - side effects
 - pharmacological effects
 - dosage
 - indications/contraindications
- f. Discuss the complications of epidural anesthesia such as:
 - high spinal
 - local anesthetic toxicity
 - hypotension
 - accidental dural puncture
- g. Discuss the differences of spinal and epidural anesthesia.
- h. Discuss the equipment required for an epidural anesthesia.
- i. Describe the technique for an epidural anesthetic.

- j. Describe use of a nerve stimulator for positioning of an epidural catheter (Tsui test).

3. Describe peripheral nerve blocks (PNB).

- a. Review anatomical landmarks for PNB.
- b. Discuss the equipment used for PNB.
- c. Describe needles and syringes used in PNB to those used in other anesthesia administrations.
- d. Describe the types of blocks such as:
 - cervical plexus
 - brachial plexus
 - intercostal
 - digital nerve blocks to the upper extremity
 - stellate ganglion
 - celiac plexus
 - Bier block
 - blocks to the lower extremities
- e. Describe complications of PNB and their treatments.
- f. Describe peripheral nerve stimulation techniques.
- g. Discuss continuous infusion blocks.
- h. Describe the medications used for PNB in terms of:
 - mechanism of action
 - side effects
 - pharmacological effects
 - dosage
 - indications/contraindications

J. Post Anesthesia Care

1. Understand the nature of peri-anesthetic care.

- a. Describe the recovery phase of anesthesia.
- b. Describe a patient recovering from anesthesia.
- c. Discuss common postoperative physiologic disorders and their treatments for conditions such as:
 - hypoxemia
 - hypoventilation
 - Malignant Hyperthermia
 - agitation
 - deviate awakening
 - nausea and vomiting
 - pain
 - bleeding abnormalities
 - hypothermia
 - hypotension
 - hypertension
 - cardiac dysrhythmias
 - renal dysfunction
- d. Understand the post-anesthetic discharge criteria.
 - fast tracking

K. Pain Management

1. Discuss management of acute postoperative pain.

- a. Discuss pain management appropriate to patient need.
- b. Discuss the neural physiology of pain in terms of:
 - nociception
 - endogenous mediators of inflammation
 - pain modulated neural transmitters
- c. Discuss analgesic drug delivery routes and systems:
 - oral
 - IV
 - IM
 - PCA
 - Epidural pumps
- d. Discuss effects of neuraxial analgesia, to intravenous and regional anesthesia.
- e. Discuss indications/contraindications for combined procedures such as:
 - Neuraxial analgesia with intravenous anesthesia
- f. Discuss alternative pharmacological and non-pharmacological approaches to the management of acute pain.

2. Discuss management of chronic pain.

- a. Discuss the concept and issues associated with chronic pain.
- b. Discuss impact of chronic pain on peri-operative care.

L. Special Considerations in Anesthesia

1. Crisis management.

For the following areas such as (but not limited to):

- cardiovascular
- metabolic
- equipment
- obstetric
- neonatal
- pulmonary
- neurologic
- cardiac anesthesia
- pediatric

- a. Identify the factors that indicate that a critical event is occurring.
- b. Consider underlying causes.
- c. Recommend and implement corrective action(s).
- d. Review efficacy of management.

2. Describe patients with cardiac disease.

- a. Describe factors affecting cardiac function and stroke volume such as:
 - myocardial oxygen supply
 - preload
 - afterload
- b. Describe left and right heart failure in terms of:
 - causes
 - hemodynamic effects
 - clinical presentation
 - treatment
- c. Discuss ischemic heart disease in terms of:
 - epidemiology and causes - autonomic nervous system response to ischemia
 - pathophysiology
 - angina pectoris
 - hemodynamic effects of ischemia
- d. Discuss acute myocardial infarction in terms of:
 - pathophysiology
 - diagnostics
 - patient presentation
 - treatment
 - hemodynamic profile

3. Discuss management of chronic pain.

- a. Discuss the concept and issues associated with chronic pain.
- b. Discuss the role of the anesthesia team in managing chronic pain.
 - pain clinic
 - consultant

4. Discuss anesthetic considerations in special circumstances.

- a. Describe anesthetic considerations for specific patient subsets such as:
 - neonatal
 - pediatric cardiac
 - obstetric
 - adult cardiac
 - septic
 - pediatric
 - geriatric
 - trauma
 - transplant
 - renal failure

- hepatic failure
- septic
- obstructive sleep apnea
- neuro
- endocrine disease

b. Describe considerations for providing anesthesia in satellite (out of OR) sites.

M. Day of Surgery Assessment

1. Describe preanesthesia assessment.

- a. Describe a preoperative anesthetic assessment as per CAS guidelines, including:
 - medical history
 - medications
 - allergy & drug reactions
 - anesthetic history
 - family history
 - smoking, alcohol & drug history
 - physical examination
- b. Determine the ASA physical status classification.
- c. Based on findings, co-morbidities, identify if the patient's condition can be improved by further assessment, treatment &/or referral.
- d. Describe the validation process that occurs.
- e. Describe informed consent in terms of:
 - anesthetic options
 - associated risks & complications
 - verify patient understanding
 - describe the consent process
- f. Develop an anesthetic care plan based on assessment findings & surgical procedure.